Important Advances in Clinical Medicine

Epitomes of Progress—Radiology

The Scientific Board of the California Medical Association presents the following inventory of items of progress in Radiology. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist the busy practitioner, student, research worker or scholar to stay abreast of these items of progress in Radiology which have recently achieved a substantial degree of authoritative acceptance, whether in his own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on Radiology of the California Medical Association and the summaries were prepared under its direction.

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Gray Scale Ultrasonography

ULTRASONIC CROSS-SECTIONAL TOMOGRAPHY using pulsed-echo techniques has gained wide clinical acceptance as a new diagnostic tool. The technique has been applied successfully in the differential diagnosis of a number of pathological processes involving many organ systems. Tissue differentiation by ultrasound is based on acoustic impedance discontinuity, which in turn is related predominately to differences in soft tissue elasticity and density. The first instrumentation developed for two dimensional ultrasonic imaging used storage oscilloscopes to record the reflected echoes. The major disadvantage of this type of signal recording was the limited ability to display the dynamic range of the returning echoes, that is, the amplitude information.

Recently, systems have been developed that are capable of preserving quantitatively the amplitude information. They have been termed "gray scale." At first, conventional nonstorage oscilloscopes were used for display and the image was built-up on a film by continuous exposure during the scanning period. Commercial manufacturers in this country have adopted a different type of recording process to preserve amplitude information. The systems make use of a television scan-converter as the temporary recording target instead of a storage oscilloscope. Magnitude information is read from the scan-converter, converted to a shade of gray and relayed to a television monitor for the final display.

With the newer signal processing, reports are already appearing in the literature confirming the anticipated improved resolution and soft tissue differentiation. Cold thyroid nodules on nuclear scans can not only be characterized as to their cyst-solid nature, but preliminary reports suggest benign versus malignant solid processes can also be differentiated. A similar type of experience has been reported with palpable breast nodules. The accuracy of placental localization is approaching 100 percent with the newer techniques. Gross congenital anomalies are more readily discovered *in utero* and hydrocephalus more accurately assessed in the neonate and early infant. A normal pancreas, which previously was rarely visualized using the older instrumentation and has always been a difficult diagnostic area with

conventional radiography, can now almost routinely be seen in whole or in part. The evaluation of liver disease has been remarkably improved with better visualization of both primary and metastatic liver abnormalities as well as improved differentiation between surgical and medical jaundice.

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Arteriographic Documentation of Coronary Arterial Spasm in Prinzmetal's Angina

PRINZMETAL'S VARIANT ANGINA is a syndrome characterized by angina occurring at rest in association with electrocardiographic ST segment elevation. While the presence of high grade lesions in the proximal portion of a major coronary artery can be shown in some patients with variant angina, the coronary arteries in others may be normal at the time of coronary arteriography. Moreover, infrequently the coronary arteriogram has been entirely normal in patients with previously documented myocardial infarction. Whereas spasm of the coronary artery has been theorized as the pathogenetic mechanism in these patients, isolated case reports in recent years have actually noted significant spasm of a major coronary artery in patients with Prinzmetal's angina.

Coronary arteriography in 17 consecutive patients with Prinzmetal angina at the University of California, San Diego, showed there to be high grade fixed obstructive lesions of the coronary arteries in nine patients and normal or insignificant lesions in the other eight patients. In three of the latter patients, there developed spontaneous spasm of the mid-right coronary (one patient), main circumflex coronary (one patient) or obtuse marginal branch artery (one patient) during the arteriographic procedure. In each instance the spasm was sufficiently severe to produce total occlusion of the involved vessel. Angina and ST segment elevation appeared concomitant with the coronary arterial spasm. Coronary arterial spasm, angina and ST segment changes were abolished by sublingual nitroglycerin administration.

Provocative pharmacoangiography, which consisted of the intravenous administration of ergonovine maleate, caused localized spasm of the right coronary artery in two other patients with Prinzmetal's angina. Again, angina and ST segment elevations occurred with the spasm and were instantaneously abolished by administration of nitroglycerin. Other investigators report a similar experience with the drug in this syndrome. Provocative pharmacoangiography in ten patients with arteriographically normal coronary arteries and chest pain, which was not characteristic of Prinzmetal's angina, did not cause coronary arterial spasm.

Therefore, coronary arterial spasm is the responsible pathogenetic mechanism for myocardial ischemia in many patients with Prinzmetal's angina and this phenomenon can be shown during coronary arteriography.

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Real Time Ultrasonography of the Abdomen and Pelvis

RECENT ADVANCES in technology now permit a diagnostician to examine the abdomen and pelvis in any patient and view a two-dimensional cross section in real time. In other words, there is simple instrumentation available that will allow a physician to observe a type of fluoroscopic tomogram, the location of which is easily selected by a hand-held array of transducers.

Vascular structures such as the abdominal aorta and the inferior vena cava are readily